DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 03/18/2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 6-8, 10 and 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Helton et al. (US 4011051).

The claims are drawn to a method of forming a particle mass comprising at least two particle populations arranged in a desired graded relationship and the article produced by the method. The method comprises the steps of forming in a container a first layer of dry particles, superimposing on the first layer by placing in direct contact a second layer of dry particles constituting a different particle size distribution and causing the particle mass to vibrate in the container by vibrating the container to cause a desired degree of particle migration across the interface under the influence of gravitational, centripetal, magnetic or electromagnetic force or combinations thereof. The container is a mould defining the desired shape of the particle mass and the particle populations of

each layer has a different set of desired physical and/or chemical properties. After or during the vibration step the particle mass is pressure compacted before being fused into a coherent article. One of the layers must contain metal particles and one of the layers must be prepared by pre-blending the components thereof prior to forming the layer in the mould.

Helton teaches a method of producing a composite wear-resistant alloy. The method comprises the steps arranging a matrix alloy in powdered form and spheroidal alloy particles in successive layers (column 4, lines 48-50) in a ceramic or graphite mould in the desired shape (column 5, lines 25-27), tamping the mixture into the cavity of the mold (column 6, lines 54-56) and brazing or sintering the mixture in a vacuum furnace to produce a solid material (column 4, lines 50-53). The spheroidal particles are formed prior to their deposition in the mold by mixing the component alloys in a molten state (column 3 lines 9-12). The spheroidal particle material has different physical properties than the alloy selected to be the matrix material, they have a much higher hardness value while the matrix material provides the necessary shock resistant properties.

It would be understood and envisage by one skilled in the art that causing the mass to vibrate while in the mould would be accomplished by vibrating the container, and that the mixing would be accomplished under the influence of at least gravitational force.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helton et al as applied to claim 1 above.

The claims are drawn to the method of producing a particle mass as described in claim 1 with the further limitation that one or more additional layers is successively stacked on the second layer, that at least one of the layers contains polymer particles and that the resulting mass is vibrated at the completion of, or at intervals during, the assembly of the stack under the influence of gravitational, centripetal or other applied forces.

Helton teaches a method of making a composite wear-resistant alloy comprising the steps of arranging a matrix alloy in powdered form and spheroidal alloy particles in successive layers (column 4, lines 48-50) in a ceramic or graphite mould in the desired

shape (column 5, lines 25-27), tamping the mixture into the cavity of the mold (column 6, lines 54-56) and brazing or sintering the mixture in a vacuum furnace to produce a solid material (column 4, lines 50-53). The spheroidal particles are formed prior to their deposition in the mold by mixing the component alloys in a molten state (column 3 lines 9-12). The spheroidal particle material has different physical properties than the alloy selected to be the matrix material, they have a much higher hardness value while the matrix material provides the necessary shock resistant properties.

Helton fails to teach the use of more than two layers, that the mixture is subject to gravitational force during the vibratory mixing step and that one of the layers contains polymeric particles.

It would have been obvious to one skilled in the art at the time of the invention to modify the teaching of Helton to include the usage of more than two layers. It is also considered that the influence of gravitational force during the mixing step is inherent in the process taught by Helton. It also would have been obvious to one skilled in the art to include polymer particles in the layered powder mixture.

Such a modification would have been motivated by the suggestion of Helton that "successive layers" (column 4, lines 54-55) could be used during the mixing process, indicating that a plurality of layers, without a limitation to two layers, is desirable. The inclusion of a polymer would have been motivated by the knowledge of one skilled in the art that the inclusion of polymers in powder mixtures that will be sintered is a common way to produce porous products, this would have been desirable so that the

industrial applicability of the method taught by Helton could be expanded to include the production of porous materials.

7. Claims 5, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helton as applied to claim 1 above, and further in view of Buljan (US 5279191).

The claims are drawn to the method of claim 1 where one or more of the layers further contains microfibres, whiskers or combinations thereof. Additionally, at least one of the layers must comprise ceramic particles and a particle layer comprising ceramic particles must be superimposed at a contact interface on a particle layer comprising metal particles.

Helton teaches the method of claim 1, but fails to teach the inclusion of microfibres or of a ceramic containing layer being superimposed on a metallic containing layer.

Buljan teaches a reinforced alumina ceramic-metal body. The body is formed by mixing a ceramic powder such as alumina(column 4, line 3), hard refractory carbides, nitrides or borides (column 4, lines 27-30), whiskers of silicon carbide (column 4, lines 40-44) and an intermetallic phase combining nickel and aluminum (column 4, lines 64-65). The metal powders and alumina are combined and mixed in powder form before the addition of a suspension of the titanium carbide powder and whiskers are added (column 6, lines 57-64). After drying the resulting slurry mixture, the mixture is sintered (column 7, lines 1-3) resulting in reinforced alumina ceramic-metal body.

Buljan fails to teach the mixture of the ceramic, metal and whisker containing powders through a process that involves the vibration of the layered powders in a container.

It would have been obvious to one skilled in the art at the time of the invention that the powder mixtures used to produce the composite body taught by Buljan could have been employed in the method taught by Helton.

One would have been motivated to make such a modification by the knowledge that powders can be mixed in a container through the use of vibratory energy to produce a desired mixture as taught by Helton, and applying such a method to the production of the body disclosed by Buljan the process could be simplified and manufacturing costs could be reduced, thereby yielding increased industrial applicability of the product. This would have been suggested by the knowledge of one skilled in the art would have of traditional powder metallurgy techniques and the knowledge that the powders used by Buljan may be combined through sintering to form a solid body.

Conclusion

8. All claims are rejected. No claims are allowed.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEVIN M. JOHNSON whose telephone number is (571)270-3584. The examiner can normally be reached on Monday-Friday 7:30 AM to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KMJ

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